

hdc

Bl

WHAT IS CLAIMED IS:

1. A semiconductor device comprising:
an active layer comprising a semiconductor film comprising
silicon, said active layer containing a catalytic element for promoting
5 crystallization of said semiconductor film; and
a gate electrode comprising a heat-resistant material
adjacent to said active layer with a gate insulating film interposed
therebetween,

10 wherein source and drain regions formed in said active layer
contain said catalyst element than other regions in said active layer.

2. The device according to claim 1, wherein said heat-resistant
material is tantalum or a material mainly comprising tantalum.

3. The device according to claim 1, wherein said catalytic
element is nickel.

4. The device according to claim 1, wherein concentration of
said catalytic element in said source and drain regions is higher than
the concentrations in said other regions by two or more orders of
magnitude.

25 5. The device according to claim 1, wherein concentration of
said catalytic element in a channel region of said active layer is less
than 5×10^{16} atoms/cm³.

6. The device according to claim 1, wherein said catalytic
element is selected from the group consisting of Fe, Co, Ni, Ru, Rh, Pd,

Os, Ir, Pt, Cu, and Au.

BEST AVAILABLE COPY

B2
cont'd
7. The device according to claim 1, wherein said gate electrode has a heat-resistance to a heat treatment of 550-700°C.

5

8. A method of fabricating a semiconductor device comprising the steps of:

10 forming a semiconductor film comprising crystalline silicon and containing a catalytic element for promoting crystallization of said semiconductor film;

forming an active layer of a thin film transistor by patterning said semiconductor film;

forming a gate electrode adjacent to said active layer with a gate insulating film interposed therebetween;

introducing phosphorus into regions in said active layer using said gate electrode as a mask, whereby source and drain regions of said thin film transistor is defined; and

20 performing a heat treatment at a temperature of 550 to 700°C to getter said catalytic element in said active layer into the regions introduced with phosphorus,

wherein said gate electrode has heat-resistance to the heat treatment.

9. The method according to claim 8, wherein material of said 25 gate electrode is tantalum or a material mainly comprising tantalum.

10. The method according to claim 8, wherein said catalytic element is nickel.

11. The method according to claim 8, wherein said catalytic element is selected from the group consisting of Fe, Co, Ni, Ru, Rh, Pd, Os, Ir, Pt, Cu, and Au.

5

12. The method according to claim 8, further comprising a step of irradiating laser for said source and drain regions after said heat treatment.

add
B2